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2003 ARCTIC GRAYLING (*Thymallus arcticus*) FRY SURVEYS IN THE INGENIKA RIVER

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ABSTRACT

Arctic grayling (*Thymallus arcticus*) were once widely distributed throughout the Williston Watershed. Evidence now suggests that over the past few decades, populations of grayling have declined (Northcote 1993). Many studies are currently being conducted to try and determine the status of the species. As part of these ongoing investigations, annual surveys are being conducted on major tributary streams of the Williston Reservoir to assess Arctic grayling distributions, relative abundance and identify critical habitats (spawning and early rearing areas).

In August 2003, the Ingenika watershed was examined to determine Arctic grayling fry distribution and habitat use of the mainstem and tributaries. Backpack electrofishing was used to look for the presence/absence of grayling fry. Angling data was used to assess adult distribution. The Ingenika River is 143 km in length with a drainage area of 5,491 km^2. Limited resource extraction activity has taken place in this drainage. Road access is possible only in the lower 36 km of the Ingenika River.

Ninety-five electrofishing sites were examined and 198 Arctic grayling fry were captured from 33 of the sites. No grayling were caught in any of the tributaries sampled. No barriers were identified on the Ingenika River in the area surveyed. Although a small pool cascade exists at km 96, adult grayling were angled upstream of this location.

Grayling fry caught were captured from a 76 km section of the Ingenika mainstem (km 2.4 – 78.4). Within the 76 km section, there were 28 grayling fry captured per km of shoreline sampled (7,000 m sampled in 49 sites). Eighty-two percent of the grayling fry were captured from isolated pools, backchannel or sidechannel habitats. Two sections of multi-channel braided areas (a 29.3 km section of the 76 km grayling distribution area) yielded 138 of the 198 grayling fry caught. This area appears to be the core grayling fry rearing area.

Substrate did not appear to be a factor in site selection for fry as seen in other systems, such as the Table and Anzac Rivers (Blackman 2002c). Rearing location is frequently a function of spawning habitat preferences as fry tend to remain near spawning areas (Armstrong 1986, Blackman 2002a).

The number of Arctic grayling fry captured per unit length from the Ingenika River (28 fish per km in 76 km) was slightly higher than the Omineca River (19 fish per km in 182 km). The multi-channel braided habitat of the Ingenika appears to support a higher density of fry, rather than fish being distributed throughout the system as was found in the Omineca (Cowie et al. 2003).

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INTRODUCTION

Background

Arctic grayling (*Thymallus arcticus*) were widely distributed throughout the upper Peace River drainage in the mid and late 1970's but the population is believed to have declined severely in the 1980's (Blackman 2002a). Limited historical information is available prior to the construction of the W.A.C. Bennett Dam in the 1960's. Overfishing, habitat degradation and reservoir impacts are probable reasons for the declines. The Peace/Williston Fish & Wildlife Compensation Program (PWFWCP) has conducted numerous surveys on tributaries of the Williston Reservoir to document this decline and determine the present distribution.

Due to the decline in stocks in the Williston watershed, and based on further information obtained from the PWFWCP studies, the B.C. Conservation Data Centre designated Arctic grayling as "red listed" (QS1). This status of QS1 red listed indicates that the species is critically imperilled within the Williston Watershed due to its extreme rarity or limiting factors that make it vulnerable to becoming extirpated or extinct (B.C. Conservation Data Centre 1995). Further conservation measures were then taken by the Ministry of Environment, Lands, and Parks by imposing catch and release regulations in 1995.

The Ingenika River Arctic grayling fry distribution project was undertaken as part of a series of surveys designed to examine the distribution and identify spawning and early rearing habitat use within streams of the Williston Watershed, where information is limited. Previous distribution studies on the Omineca and Osilinka Rivers found very low numbers of grayling fry and limited distribution within the Osilinka River (Cowie et al. 2003).

The grayling distribution and habitat information will be available to agencies for consideration during planning processes and to assist in identifying critical habitat areas. Through planning processes such as Land and Resource Management Plans (LRMP), critical spawning and rearing habitats may be protected. Under the Fort St. James and Mackenzie LRMP processes, 128 km of the Omineca River Valley was designated as Resource Management Zone (RMZ) protected area (LRMP, Fort St. James 1999 and Mackenzie 2000).

The objectives of the Ingenika River study were to:

- determine the distribution and relative abundance of Arctic grayling fry;
- identify critical habitats (spawning and early rearing areas) for habitat protection purposes; and
- compare habitat use with those found in other areas to assess consistency of habitat selection in different drainages.

Study Area

The Ingenika River (Figure 1) has a drainage area of 5,491 km^2 and its total length has been reported as 119 km up to the 1,220 m elevation contour (Bruce and Starr 1985),

while a Watershed Code (WSC) query provides a total length of 143.4 km (MWLAP, Watershed Code Dictionary, 1995). For the purposes of this report, the WSC stream length of 143 km will be used.

The Ingenika watershed is remote and the upper portion of the watershed is pristine. Timber harvesting, mining and other resource extraction is limited to the lower section around the Swannell River. Review of Terrestrial Resource Inventory Mapping (TRIM) orthophotos created in 1996-1999 and satellite imagery support this previous statement.

Barriers

Tributaries of the Ingenika River were flown to identify and record (Appendix 3) potential barriers to fish passage. Barriers would include waterfalls, areas of high velocity, or other structures which may impede fish passage (i.e. beaver dams).

Historical Discharge

Historical discharge data was obtained from Environment Canada (Water Survey Canada) (http://scitech.pyr.ec.gc.ca/waterweb/) to assess discharge rates for the 2003 field season. Discharge data has been collected on the Ingenika River by Water Survey Canada (WSC) for a number of years. The station is located just upstream of the confluence with Swannell River. Monthly discharge averages for a ten year period (1993-2002) were compared to discharge in 2003 for the Ingenika River.

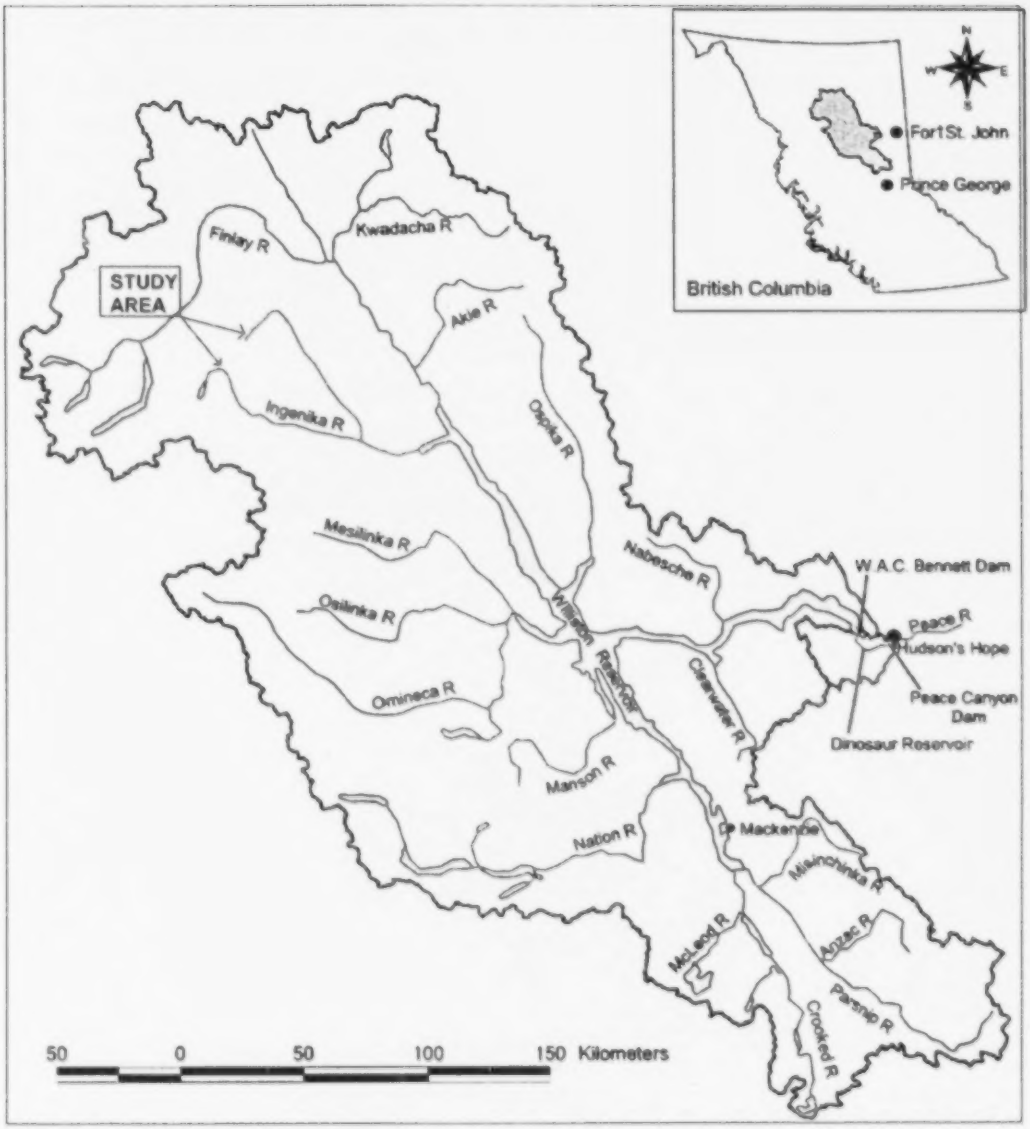

Figure 1. Location of the Ingenika River in the Williston drainage.

METHODS

Arctic grayling fry and adult distribution surveys were conducted in late August, 2003. Fry presence/absence was verified with the use of an electrofisher, while adults were verified with the use of angling gear. Access to the study area was solely by helicopter.

FRY DISTRIBUTION

Site Selection

Sites were selected at the time of the survey using orthophoto/satellite imagery, 1:20,000 map sheets and based on the following criteria:

- landing/access of site (helicopter access);
- potential of supporting Arctic grayling fry (based on knowledge from previous studies in the Williston watershed);
- habitat available to sample; and
- overall site distribution.

In the process of site selection, crews attempted to maintain a general consistency of distribution (i.e. not clumping sites together or missing sections where access could be obtained). Although, once distribution was established, some additional sites were added to better delineate the distribution. Sites were marked on orthophotos as conducted to track general distribution and to allow for visual checks for large sample area gaps.

Sample Technique

Open site backpack electrofishing was the primary sampling technique. Two Smith-Root Model 12 battery operated backpack electrofishers (EF) were used to capture fish. Electrofishing was conducted by an experienced two person crew in a single upstream pass along the shoreline, with an average width of 1-2 m. The width of sites varied slightly with water depth and velocity. No stop nets were used.

A 100 m length of shoreline was the target for each site. However, because quite diverse habitats (shoreline, isolated pools, side and back channels) were available at some of the site locations, sampling effort was adjusted to incorporate this diversity. The amount and type of habitat sampled was noted in the site cards for reference.

Settings used for the EF varied depending on a variety of factors including water temperature, depth, conductivity, size range of fish, and observed recovery time. Generally it was necessary to set the machines high (e.g. 700 to 1000 volts and 60 to 90 Hz) because of low water conductivity. The EF settings and effort were recorded for each site.

Data Collection

Habitat data collected for each site included site length, temperature, average water depth, average site substrate, and comments on velocity. The site length was obtained using a range finder. In the case of isolated pools, the length and width (surface area) was also recorded. Temperature was measured with a pocket mercury thermometer in degrees Celsius. Water depth was determined using a metre stick and recorded to the nearest centimetre (cm). Substrate was recorded as % fines-gravel-cobble-boulder through crew observation. Conductivity was not measured.

Fish caught were identified to species, weighed to the nearest gram (g) and measured (fork length) to the nearest millimetre (mm). Site data on habitat and species caught, is on file at the Peace/Williston Fish and Wildlife Compensation Program office (address on cover).

ADULT DISTRIBUTION

Angling

Angling was conducted, both in the mainstem and tributaries, to provide an initial overview of adult Arctic grayling population distribution in the system. Angling was conducted at opportunistic sites using both fly and spinning gear. All grayling caught were measured for fork length to the nearest millimetre (mm). Scale samples were taken from Arctic grayling and age determination analysis was performed by Jensyd Bio Tech Ltd. (Nanaimo, B.C.). Prints of the scales and age markings were provided for each fish, and reviewed by PWFWCP fish biologists for accuracy.

RESULTS

Historical Discharge

In 2003, the recorded average daily discharge from January to August was 67.2 cubic metres per second (m^3/s). This is slightly lower than the ten year average of 75.5 m^3/s (Appendix 1, Figure 2).

Ingenika River Electrofishing

Ninety-five electrofishing sites (Figure 3) were conducted on the Ingenika River and associated tributaries. The total shoreline sampled length was 13.1 km (11% of total length) (9.8 km of mainstem and 3.3 km of tributaries). The average site length was 138 m, with site lengths ranging from 70 to 400 m. Total electrofishing seconds were 52,027, with an average of 548 seconds per site.

Thirty-three sites, located between km 2.4 and 79 (approximately 76 km), yielded 198 Arctic grayling. Ninety-one (46%) of the grayling were caught in isolated pools on gravel bars. Thirty-six (18%) were caught in the mainstem, and the remaining 71 (36%) were

caught in backchannel and sidechannel habitats. No Arctic grayling were caught in any of the tributaries sampled.

Sculpin (*Cottus* species) were the most frequently caught fish (1,065 in 74 sites). Mountain whitefish (*Prosopium williamsoni*) were the next most common (595 in 65 sites). Arctic grayling were the third, with 198 in 33 sites (Table 1). Bull trout (*Salvelinus confluentus*) (159) were caught in 41 sites. Rainbow trout (*Oncorhychus mykiss*) (75) were caught in 25 sites. Only one burbot (*Lota* species) was caught.

Visual estimates of 5,000+ fish in isolated pools were made at four electrofishing sites. These small (<25 mm) fry were later verified as white suckers (*Catostomus commersoni*) by Dr. M. Shrimpton (Assistant Professor, Biology, University of Northern British Columbia) from voucher specimens. Three of the sites were within the core grayling sites (Figure 3).

Table 1. Numbers and species of fish captured from electrofishing sites in the Ingenika River (2003).

	Totals	Arctic grayling*	Bull trout	Rainbow trout	Mountain Whitefish	Burbot	Other/ sculpins**	No Fish
Sites	95	33	41	25	65	1	79	3
Length sampled (km)	13.1	4.7	5.8	3.2	8.9	0.2	10.6	0.4
# fish	2158	198	159	75	595	1	1167	0

* 91 GR were from isolated pools

** does not include visual estimates of white suckers (5 000+)

Ingenika River Angling

Angling was conducted at 17 sites along the mainstem of the Ingenika River and tributaries (Appendix 2). Eleven grayling were caught from five sites in the mainstem. Adult grayling were angled as far upstream as km 102 (directly upstream of Flameau Creek, EF site 95). These 11 fish ranged in age from 5+ to 9+ and were from 330 to 470 mm in fork length. Four rainbow trout were also angled but no age analysis was conducted.

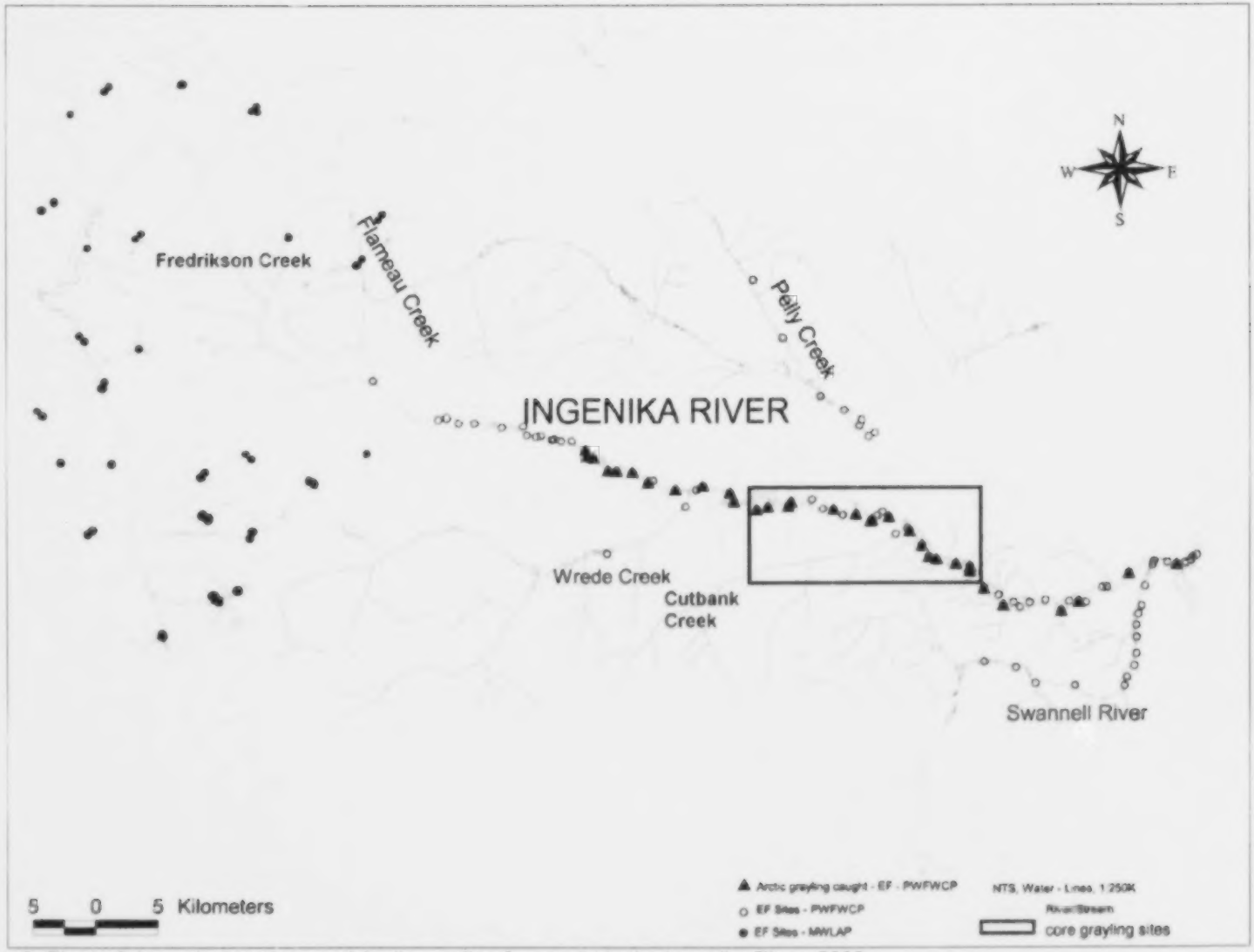

Figure 3. Electrofishing site locations and Arctic grayling fry caught in the Ingenika River, 2003.

DISCUSSION

The data collected may be biased with respect to habitat use because sample locations were not randomly chosen. Sites were chosen based on previous knowledge of the habitat preferences of grayling fry. Access to these sites was limited to helicopter landing areas. However, most but not all accessible bars within the distribution range were sampled. Once a general indication of Arctic grayling distribution was determined, additional sites were chosen upstream and downstream in an attempt to expand the known distribution of grayling fry. Sites were not conducted upstream of the confluence of Flameau Creek with the Ingenika mainstem, as MWLAP staff conducted extensive sampling in early August and no grayling were caught (T. Zimmerman, Omineca Fish & Wildlife Science/Allocation, MWLAP, pers. comm., Figure 3).

Ingenika River

One hundred and ninety-eight Arctic grayling fry were caught in the Ingenika mainstem from km 2.4 to km 79 (76 km). No grayling were caught in any of the tributaries sampled. The relative density of Arctic grayling fry caught in the Ingenika River mainstem was 28 grayling fry per km of shoreline sampled.

The majority of grayling fry (82% of total GR caught) were associated with either isolated pools (46%) or backchannel/sidechannel habitats (36%). These habitats were frequently much warmer (up to 16°C in isolated pools) than the mainstem Ingenika (8 to 10°C). There was no difference in the substrate between sites where grayling were observed versus where they were absent (Figure 4 A + B).

Seventy percent (138 of 198) of the grayling fry were captured in a 29.3 km section (between river km 28.0 and km 57.3, Figure 3: core grayling sites). Two sections of multi-channel braided habitat (totalling 12.9 km) was identified within the 29.3 km high use section.

The Ingenika River has extensive backchannel and sidechannel habitat. The amount of the backchannel/sidechannel habitat varies with water levels. No area calculations were made of the amount of this type of habitat available. Channel braiding is common throughout the lower and middle sections of the Ingenika River, but was most prominent in the 29.3 km section (mid Ingenika). The backchannel/sidechannel habitat appears to be quite stable. The braided areas are well established and provide extensive rearing habitat. Photo documentation was completed for each site and is available at the PWFWCP office (address on the inside report cover). Selected photo documentation is included at the end of this report.

Isolated pools and backchannel/sidechannel habitats have been found to be high use rearing habitats in other Williston watershed streams (Osilinka, Table and Anzac Rivers) (Cowie et al. 2003). These habitat types are typically warmer than mainstem areas and have smaller substrates. Side and backchannel areas may provide protection from seasonal flood events, which may play a key role in the success/failure of the young of the year survivals. Low/high water years or unusual discharge patterns may increase the risk of fry stranding, as observed in the Osilinka River in 2002 (Cowie et al. 2003) and in the Table and Anzac Rivers (Blackman et al. 2001, Blackman 2002b & c).

The size of Arctic grayling fry in the Ingenika River was consistent with fry in the Omineca, Osilinka, Table and Anzac Rivers (Figure 5-10) sampled in previous studies. It is interesting to note that the fry population in the mid Ingenika (N= 107) has fewer smaller sized fish than the fry in the lower river (N= 92)(Figure 6). This may be a function of the braiding and multi-channel river characteristics that are common in the mid river (core grayling fry area). These areas typically provide warmer temperatures (9-16 °C in the braided areas versus 8-10 °C in the Ingenika mainstem) which allows for more optimum growth of juveniles (Ford et al. 1995). The four fish in size range 85-100 mm were probably 1+.

Previous surveys indicated that adult Arctic grayling use Swannell River (M.B. Stamford, University of British Columbia, Fish Museum, pers. comm.). Although electrofishing and angling surveys were conducted, no adult or fry grayling were located in this or any other tributary. It is not known if this is a result of reduced distribution or simply a slightly different distribution of grayling throughout the Ingenika watershed in 2003.

Angling produced eleven adult Arctic grayling (330 to 470 mm fork length). Ages ranged from 5+ to 9+, as aged by Jensyd Bio Tech Ltd. These ages could be underestimated because the fish were aged by scale only. Age structure comparisons in Arctic grayling have shown that scales taken from fish larger than 330 mm fork length underestimated ages of fish 4+ (Blackman et al. 2001).

System Comparisons

Ingenika grayling fry distribution was restricted to the lower and mid mainstem, a pattern similar to that seen in the Table, Anzac and Osilinka Rivers. The distribution did extend further upstream than anticipated, based on substrate and gradient observations in the other watershed streams. This may be a function of the natural range being restricted in systems where grayling populations have been impacted. In the Osilinka River, where impacts have been fairly severe, the grayling fry distribution did not extend to the stream mouth (a slightly higher gradient and larger substrate) or in some other reaches with low gradient fine substrate, where grayling were anticipated. The Arctic grayling fry caught in the Osilinka River were limited to a 38 km braided stretch of the mainstem (between km 12 and 50). No fry were caught in any Ingenika tributaries, as was found in the Osilinka River. In the Omineca River, a relatively pristine system, grayling fry were caught throughout the drainage, including 3 major tributaries. Arctic grayling were distributed from the confluence with the Osilinka River upstream for 182 km (almost the Omineca headwaters).

Forty-six percent of the Ingenika fry were caught in isolated pools, as compared to the eighty-five percent caught in isolated pools in the Osilinka. The high occurrence of grayling fry in isolated pools has been noted in the Table and Anzac Rivers (Blackman 2001, 2002c) and high mortalities of grayling fry by stranding has been noted by numerous authors (deBruyn and McCart 1974, Peterson 1968, McCart et al. 1972, Blackman 2002b). Stranding does appear to be more severe in heavily logged watersheds, as channels widen and bars become more prevalent (Barrett et al. 1998, Foy et al. 1997, Hogan et al. 1997).

Arctic grayling fry in the Ingenika River did not appear to show a preference for a particular substrate, as has been found in other systems (Osilinka, Table and Anzac Rivers). Table and Anzac Rivers grayling fry showed a strong preference for shallow low velocity habitat. Fry showed a preference for areas with a high fines content substrate and avoided areas with cobble substrate. Grayling fry were frequently associated with small woody debris cover. The Arctic grayling fry caught in the Osilinka preferred shallow low velocity habitats, as found in the Table/Anzac Rivers and other river systems, and therefore may be subject to increased stranding risk when the flows drop in the late summer (Blackman 2002 a,b). Omineca Arctic grayling had a wide distribution throughout the drainage.

The surveys in the Ingenika, Omineca and Osilinka Rivers were intended to document distribution rather than abundance, however a basic comparison of fish densities between systems illustrates the relative use of each watershed by Arctic grayling. The Ingenika grayling fry relative density was 28 fry/km of shoreline sampled (54 sites), using all sites within the fry distribution. The Omineca River had 19 fish/km in the mainstem (89 sites) and 10 fry/km in the tributaries (6 sites). The Osilinka River had 9 fry/km (15 sites within the 38 km section grayling were found). If only sites where grayling were caught are reviewed, the Ingenika River has a relative density of 44 fry/km (33 sites). The Omineca has 28 fry/km and the Osilinka River was 67 fry/km (including isolated pools) and 10 fry/km if isolated pools are excluded. The Table and Anzac Rivers calculations of 30–80 fry/km from high use index sites did not include grayling caught in isolated pools. Extensive surveys on the Table and Anzac Rivers have failed to find significantly higher numbers of fry.

Grayling fry densities may be strongly influenced by spring stream flow patterns (Blackman 2002a; Nelson 1954; Armstrong 1986; Northcote 1993). Therefore, comparisons of relative abundance between systems from data collected in different years should not be taken as a true reflection of the populations but only as a rough comparison.

CONCLUSION

Arctic grayling fry were distributed in a 76 km section of the Ingenika River, from km 2.4 upstream to km 79. No grayling fry have been observed above the confluence with Flameau Creek. No grayling were observed during this study in tributaries to the Ingenika River, although previous studies did confirm adult grayling in the Swannell River. We suspect the absence of grayling from the Swannell River may be a loss of range as a result of angling pressure and habitat impacts but this should be confirmed.

Arctic grayling fry distribution in the Ingenika River, as in the in Omineca River, is more extensive than that observed in the Osilinka River. Limited access and therefore reduced angling pressure may be related to the broader distribution observed in the Ingenika and Omineca Rivers.

Backchannel, sidechannel and isolated pool habitats play a significant role in the rearing habitat for Arctic grayling fry populations in the Ingenika River. Multi-channel braided habitat is frequent within the 76 km, with a 29.3 km section that yielded 70% of the fry

caught. Industrial impacts to date are minimal in the Ingenika watershed, which may partly explain the relatively stable discharges recorded in that system

ACKNOWLEDGEMENTS

Funding for this project was provided by PWFWCP. Data collection was collected by field crews, consisting of M.Giroux, E.Murphy, B.Blackman, and D.Cowie. Review of the report was completed by Ted Zimmerman and Randy Zemlak.

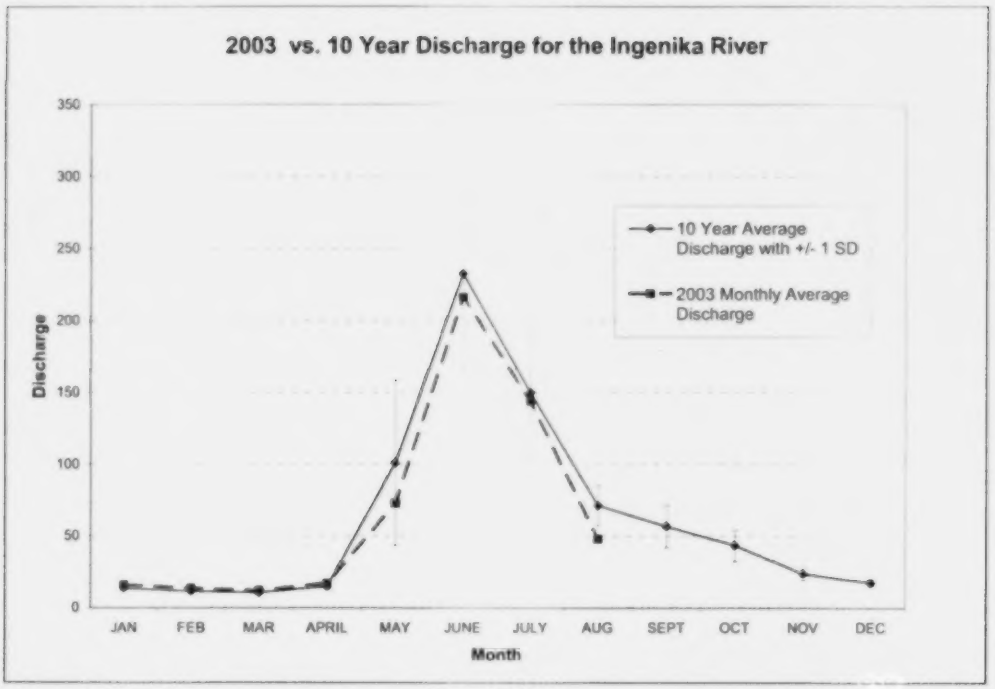

Figure 2. 2003 vs. 10 year (1993-2002) average monthly discharge of the Ingenika River.

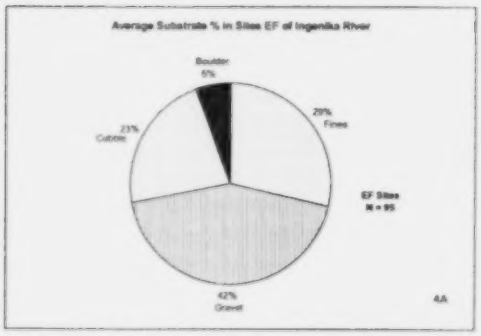

Figure 4A. Average substrate % in EF sites in the Ingenika River.

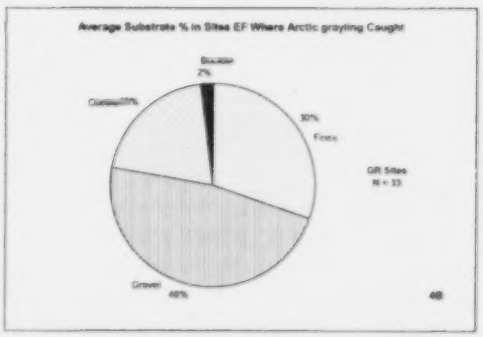

Figure 4B. Average substrate % where Arctic grayling were caught in EF sites in the Ingenika River.

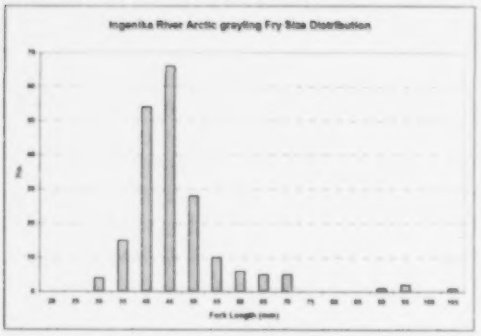

Figure 5. Size distribution of Arctic grayling fry captured from August 28–September 1, 2003 in the Ingenika River.

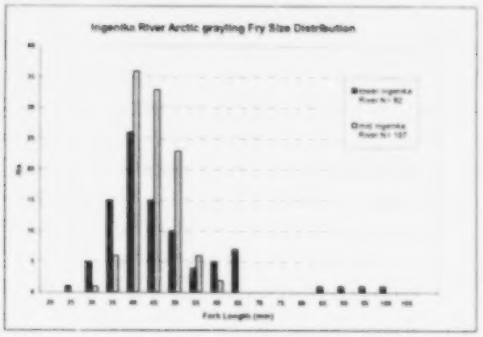

Figure 6. Size distribution comparison of the lower and mid Ingenika River of Arctic grayling fry captured from August 28–September 1, 2003.

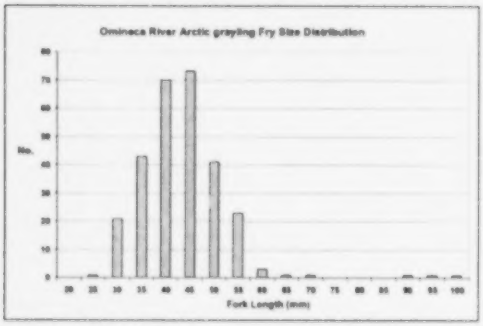

Figure 7. Size distribution of Arctic grayling fry captured from August 28-September 14, 2001 in the Omineca River.

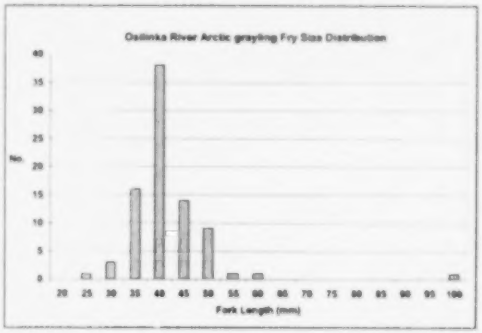

Figure 8. Size distribution of Arctic grayling fry captured from August 27-31, 2002, in the Osilinka River.

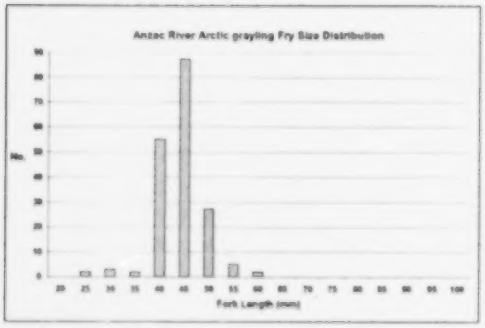

Figure 9. Size distribution of Arctic grayling fry captured from August 19-28, 1997 in the Anzac River.

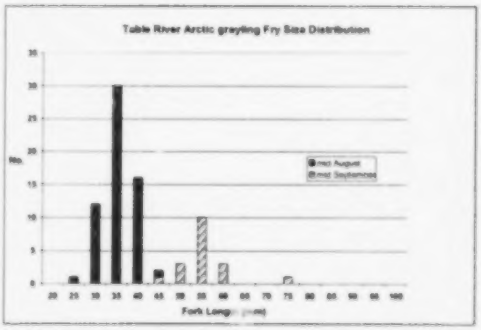

Figure 10. Size distribution of Arctic grayling fry captured from August 12-14 and September 17th 1997 in the Table River.

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PHOTO DOCUMENTATION

All photographs are from within the core grayling area in the Mid Ingenika. Photographs are of mainstem, side or back channels and isolated pools where Arctic grayling fry were located. Site were frequently sampled for both mainstem and additional habitats types.

Photo 1. Site 21: Ingenika River mainstem habitat.

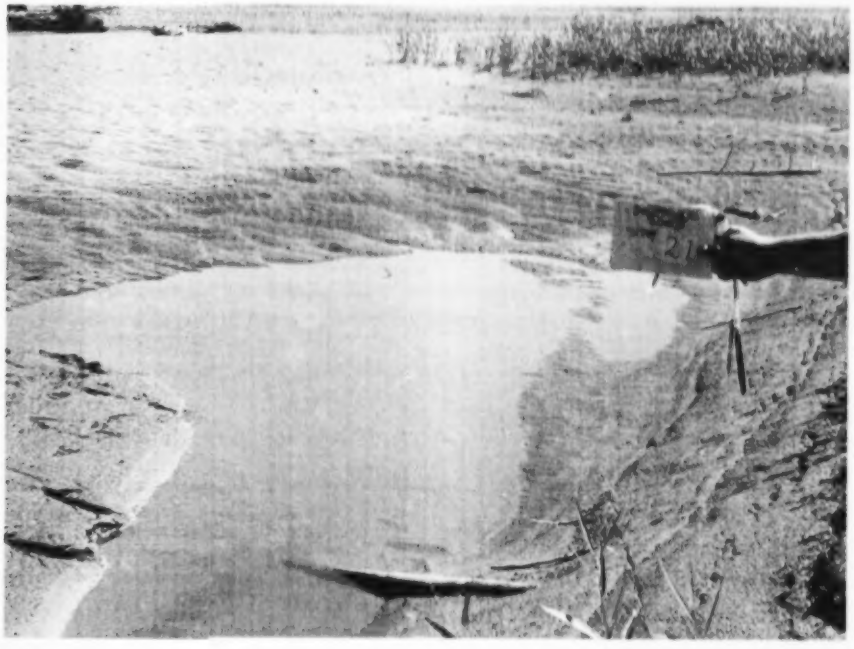

Photo 2. Site 21: isolated pool habitat.

Photo 3. Site 23: side channel habitat.

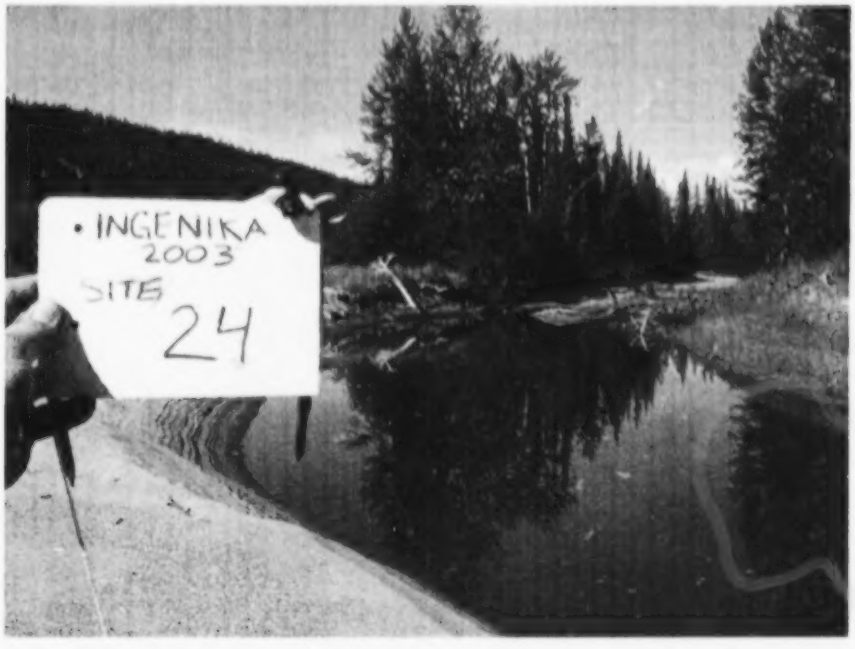

Photo 4. Site 24: isolated pool habitat.

Photo 5. Site 26: isolated pool habitat.

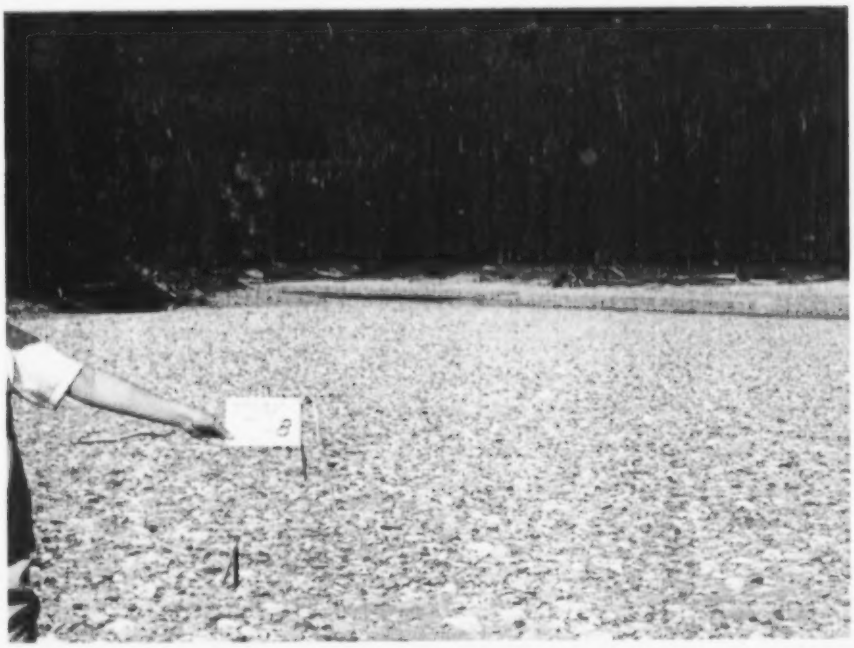

Photo 6. Site 28: side channel habitat.

Photo 7. Site 33: back channel habitat.

Photo 8. Site 33: isolated pool habitat.

APPENDICES

Appendix 1

Ingenika River Historic Discharge Data

Measurement of cubic metres per second (m^3/s)

YEAR	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1993	11.8	11	9.37	14.1	180	158	104	66	39.1	28.3	18.8	13.3
1994	11.4	8.83	9.76	14.9	113	214	148	78.4	77.7	51.7	23.2	17.9
1995	15.8	13.3	11.4	12.8	133	153	147	64.5	44.6	29.2	15.5	15
1996	12.3	10.9	9.3	15.2	56.7	275	244	98.3	62.6	54.5	24.3	16.9
1997	14	11.1	9.92	13.8	124	231	118	77.2	68.7	52.7	26.8	20.8
1998	15.4	13.8	13.3	15.5	198	134	74	47	36.9	44.5	21.5	16.6
1999	15.1	12.8	11.7	17.5	52.3	294	163	56	44.2	34.4	22.1	16.5
2000	13.3	11.3	10.1	14.5	40.4	248	142	68	69.1	43.2	25.1	17.6
2001	12.5	10.1	9.28	17.2	44.3	302	187	79	51.7	35.5	25.9	16.2
2002	12.5	10.7	9.74	11.3	66	313	170	77	71.8	59.2	31.2	20.1
2003	15.7	13.3	11.7	16.9	72.6	216.0	143.6	47.9	n/a	n/a	n/a	n/a

Station is located upstream of the Swanell River confluence.

Appendix 2

Ingenika River Angling Locations

To establish and determine a rough initial distribution of adult Arctic Grayling, angling was conducted as various points along the Ingenika mainstem and the Swannell River (a major tributary). Sites numbers correlate to either electrofishing sites or have been given a letter/number identification (e.g. A1).

Angle sites on the Ingenika and Swannell Rivers.

Site	Zone	Easting	Northing	Fish Caught	Age	Description
A1	9	0669122	6305267	Rb (got away)	n/a	U/S Fredrickson Creek
A2	9	0680314	6303355	3 X GR	7+, 8+, no age	D/S Flameau Creek
A3	10	0321330	6302447	none	n/a	U/S Wrede Creek
A4	10	0349143	6293211	none	n/a	U/S Pelly Creek; poor site
A5	10	0333843	6296719	1 X GR	6+	U/S Wrede Creek
A6	10	0331468	6297472	none	n/a	½ way between Wrede + Flameau Creeks
A7	10	0321278	6302197	none	n/a	
A8	10	0327659	6291939	none	n/a	Wrede Creek; EF site 90
A9	9	0674901	6305990	1 X GR	Poss. 9+	U/S Flameau Creek; EF site 95
A10	9	0682175	6302903	2 X GR	8+, poss. 6+	D/S falls
A11	10	0317763	6302828	none	n/a	
A12	10	317643	6302828	4 X GR	7+, 6+, 6+, shows 5+	D/S EF Site # 58
A13	10	0371690	6289327	none	n/a	Mouth of Swannell R; ~ 80 KO
A14	10	0370335	6284644	none	n/a	Swannell River
A15	10	0368395	6279039	none	n/a	Swannell R.; pools U/S upper bridge
A16	10	0364329	6285549	Rb	n/a	U/S of Swannell R.
A17	10	0346923	6294428	2 X Rb	n/a	U/S Pelly Creek

Appendix 3

Barriers on the Ingenika River Tributaries.

Tributary	Zone	Easting	Northing	Description	Comments
Swannell River	10	0368395	6279039	2 X 0.9-1.2 m falls	BT may pass but probably not GR
Cutbank Creek	10	0349192	6291057	0.9-1.8 m falls	
Pelly Creek	10	0350833	6295000	Series of small cascade pools for 3 Km that may impede passage	

NB. Flameau and Fredrickson Creeks were not flown to assess barriers.

Appendix 4

Ingenika 2003 Arctic Grayling Electrofishing Database

INGENIKA River GR EF Assessment									Substrate %											
Aug/Sept 2003				UTM					F= fines, G= gravel, C= cobble, B= boulder					EF gear		FISH				
WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	1	10	374977	6289609	180	9.0	0-20	10	25	55	10	no flow	I5 @ 500V	1746	MWF	2	n/a	n/a		100m MS + 80m Isolated pool; ~1Km from mouth
230-9913	Ingenika River	1														CC	16	n/a	n/a		
230-9913	Ingenika River	1														SU	1	n/a	n/a		
230-9913	Ingenika River	2	10	374386	6289095	100	11.0	25	70	20	10	0	MS fast w/ sm. BC	90Hz @ 300	789	MWF	11	n/a	n/a		Small BC- SU only; MWF caught in shallow at top of bar
230-9913	Ingenika River	2														CC	14	n/a	n/a		
230-9913	Ingenika River	2														SU	2	n/a	n/a		
230-9913	Ingenika River	2														LNC	1	n/a	n/a		
230-9913	Ingenika River	3	10	371857	6289341	100	9.0	0-35	10	20	60	10	very slow	I5 @ 500V	511	CC	23	n/a	n/a	missed a BB	D/S mouth of Swanell R
230-9913	Ingenika River	3														MWF	43	n/a	n/a		
230-9913	Ingenika River	4	10	371759	6289101	115	9.0	10-20	30	40	30	0	dead BC quick MS	90 Hz @ 300	786	CC	25	n/a	n/a	1 spoonhead CC	long BC w/ lots of slim; poor habitat
230-9913	Ingenika River	5	10	369795	6288516	200	9.0	10	100	0	0	0	back eddy	I5 @ 500V	989	GR	21	54	n/a	1 GR caught in MS, all others in IP	MS: habitat highly variable from 100% fines to 60% boulders; IP sand substrate
230-9913	Ingenika River	5														GR		39	n/a		
230-9913	Ingenika River	5														GR		54	n/a		
230-9913	Ingenika River	5														GR		45	n/a		
230-9913	Ingenika River	5														GR		49	n/a		
230-9913	Ingenika River	5														GR		50	n/a		
230-9913	Ingenika River	5														GR		40	n/a		
230-9913	Ingenika River	5														GR		43	n/a		
230-9913	Ingenika River	5														GR		42	n/a		
230-9913	Ingenika River	5														GR		36	n/a		
230-9913	Ingenika River	5														GR		44	n/a		
230-9913	Ingenika River	5														GR		46	n/a		
230-9913	Ingenika River	5														GR		39	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	5														GR		49	n/a		
230-9913	Ingenika River	5														GR		45	n/a		
230-9913	Ingenika River	5														GR		43	n/a		
230-9913	Ingenika River	5														GR		54	n/a		
230-9913	Ingenika River	5														GR		47	n/a		
230-0913	Ingenika River	5														GR		38	n/a		
230-9913	Ingenika River	5														GR		42	n/a		
230-9913	Ingenika River	5														GR		45	n/a		
230-9913	Ingenika River	5														MWF	16	n/a	n/a		
230-9913	Ingenika River	5														SU	15	n/a	n/a		
230-9913-032	Swannell River	6	10	371024	6287428	75	9.0	5-30	60	35	5	0	fast MS slow BC	90 Hz @ 300	492	CC	18	n/a	n/a		good deep BC pool
230-9913-032	Swannell River	6														MWF	1	n/a	n/a		
230-9913	Ingenika River	7	10	367996	6287463	80	9.0	0-35	10	30	50	10	variable	I5 @ 500V	377	CC	62	n/a	n/a		
230-9913	Ingenika River	7														Rb	1	23	n/a		
230-9913	Ingenika River	8	10	367629	6287457	400	12.0	5-10	30	70	0	0	slow to dead calm	90 hz @ 300	793	MWF	1	n/a	n/a		great gravel but NO FISH; sampled both sides of bar = 200m per side
230-9913	Ingenika River	8														SU	2	n/a	n/a		
230-9913	Ingenika River	9	10	365651	6286406	180	9.0	0-25	90	10	0	0	slow	I5 @ 500V	300	GR	1	58	n/a		IP temp= 16C; 100m MS very few fish; thousands of unknown (dace?) + GR+ MWF in IP
230-9913	Ingenika River	9														MWF	11	n/a	n/a		
230-9913	Ingenika River	9														C	3	n/a	n/a		
230-9913	Ingenika River	10	10	366258	6286290	124	12.0	4	50	50	0	0	slow glide	90 Hz @ 300	525	SU	10	n/a	n/a		
230-9913	Ingenika River	10													525	MWF	1	n/a	n/a		
230-9913	Ingenika River	10													525	LNC	2	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
																					very few fish; potential spawning gravel; gravel glide w/ no cover; all fish at top in small pocket
230-9913	Ingenika River	11	10	364228	6285750	150	9.0	0-20	20	70	10	0	glide	I5 @ 500V	715	GR	1	39	n/a		
230-9913	Ingenika River	11														MWF	2	n/a	n/a		
230-9913	Ingenika River	12	10	364870	6286460	170	12.0	2-20	5	50	0	0	calm but fast	90 Hz @ 300	555	MWF	2	n/a	n/a		cabins
230-9913	Ingenika River	12														CC	12	n/a	n/a		
																					lots of small dace? In IP; 100m SC + 80m IP
230-9913	Ingenika River	13	10	362953	6286617	180	9.0	0-20	100	0	0	0	slow	I5 @ 500V	432	0	0				
230-9913	Ingenika River	14	10	360873	6286158	125	12.0	10	40	60	0	0	slow riffle	90 Hz @ 300	488	CC	8	n/a	n/a		
230-9913	Ingenika River	15	10	359545	6286406	150	9.0	0-25	40	40	20	0	glide	I5 @ 500V	988	GR	1	28	n/a		all fish in small alcove
230-9913	Ingenika River	15														MWF	4	n/a	n/a		
230-9913	Ingenika River	15														CC	5	n/a	n/a		
230-9913	Ingenika River	16	10	361653	6286459	173	n/a	3-12	40	50	10	0	slow glide + eddies	90 Hz @ 300	487	MWF	3	n/a	n/a		
230-9913	Ingenika River	16														CC	10	n/a	n/a		
230-9913	Ingenika River	17	10	358020	6287819	100	9.0	0-30	10	80	10	0	dead / backwater	I5 @ 500V	389	GR	1	45	n/a		backchannel + 2 X IP
230-9913	Ingenika River	17														MWF	17	n/a	n/a		
230-9913	Ingenika River	18	10	360389	6286576	204	n/a	10	50	50	0	0	slow SC	90 Hz @ 300	529	MWF	1	n/a	n/a		
230-9913	Ingenika River	18														CC	13	n/a	n/a		
																				fish very spooky-need to trap	MS: no fish in first 100m, 17 in alcove; with rest fish in IP;
230-9913	Ingenika River	19	10	356940	6289267	150	9.0	0-30	10	40	40	10	dead	I5 @ 500V	670	BT	1	45	n/a		
230-9913	Ingenika River	19														GR	7	56	n/a		
230-9913	Ingenika River	19														GR		50	n/a		
230-9913	Ingenika River	19														GR		50	n/a		
230-9913	Ingenika River	19														GR		42	n/a		
230-9913	Ingenika River	19														GR		39	n/a		
230-9913	Ingenika River	19														GR		41	n/a		
230-9913	Ingenika River	19														GR		42	n/a		
230-9913	Ingenika River	19														MWF	38	n/a	n/a		
230-9913	Ingenika River	19														C	5 000	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	20	10	359229	6287244	130	n/a	15	40	60	0	0	small SC slow riffle	90 Hz @ 300	380	BT	2	34	0.4		some L+S WD; no picture
230-9913	Ingenika River	20														BT		45	1.0		
230-9913	Ingenika River	20														CC	11	n/a	n/a		
230-9913	Ingenika River	20														MWF	2	n/a	n/a		
230-9913	Ingenika River	21	10	355848	6289927	120	9.0	0-40	20	50	30	0	glide	15 @ 500V	385	GR	18	55	1.7	good weights	100m MS- fish in alcoves 10 MWF + 2 GR; IP rest:all fish in deep 20 cm temp pool 15 'C
230-9913	Ingenika River	21														GR		60	2.2		
230-9913	Ingenika River	21														GR		36	0.5		
230-9913	Ingenika River	21														GR		63	2.3		
230-9913	Ingenika River	21														GR		65	2.6		
230-9913	Ingenika River	21														GR		66	2.7		
230-9913	Ingenika River	21														GR		65	2.6		
230-9913	Ingenika River	21														GR		41	0.7		
230-9913	Ingenika River	21														GR		64	2.7		
230-9913	Ingenika River	21														GR		60	2.5		
230-9913	Ingenika River	21														GR		66	2.8		
230-9913	Ingenika River	21														GR		68	3.0		
230-9913	Ingenika River	21														GR		64	2.5		
230-9913	Ingenika River	21														GR		59	2.0		
230-9913	Ingenika River	21														GR		42	0.6		
230-9913	Ingenika River	21														GR		69	3.4		
230-9913	Ingenika River	21														GR		54	1.5		
230-9913	Ingenika River	21														GR		66	3.1		
230-9913	Ingenika River	21														BT	1	43	1.1	FAT	
230-9913	Ingenika River	21														MWF	38	n/a	n/a		
230-9913	Ingenika River	21														LNC	1	n/a	n/a		
230-9913	Ingenika River	21														CC	12	n/a	n/a		
230-9913	Ingenika River	21														C	1	n/a	n/a	voucher	
230-9913	Ingenika River	22	10	356990	6289623	120	n/a	5-10	40	60	0	0	very slow	90 Hz @ 300	792	GR	3	41	0.7	FAT; 1 GR from IP	small deep IP + MS bar; dead slow
230-9913	Ingenika River	22														GR		42	0.8	FAT	
230-9913	Ingenika River	22														GR		36	0.7		
230-9913	Ingenika River	22														MWF	2	n/a	n/a		
230-9913	Ingenika River	22														CC	15	n/a	n/a		
230-9913	Ingenika River	22														SU	3	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	23	10	353189	6291499	100	12.0	0-20	80	20	0	0	glide	I5 @ 500V	695	GR	9	42	n/a		side channel:sand, nearly NO COVER
230-9913	Ingenika River	23														GR		41	n/a		
230-9913	Ingenika River	23														GR		40	n/a		
230-9913	Ingenika River	23														GR		42	n/a		
230-9913	Ingenika River	23														GR		30	n/a		
230-9913	Ingenika River	23														GR		43	n/a		
230-9913	Ingenika River	23														GR		49	n/a		
230-9913	Ingenika River	23														GR		46	n/a		
230-9913	Ingenika River	23														GR		46	n/a		
230-9913	Ingenika River	23														MWF	63	n/a	n/a		
230-9913	Ingenika River	24	10	354311	6290347	70	n/a	5-40	90	10	0	0	Isolated pools	90 Hz @ 300	473	BT	1	53	2.2	very fat	only EF IP; GR photo's; really warm pools ~ 15'C
230-9913	Ingenika River	24														GR	9	103	9.4		
230-9913	Ingenika River	24														GR		86	8.4		
230-9913	Ingenika River	24														GR		95	7.8		
230-9913	Ingenika River	24														GR		36	0.5		
230-9913	Ingenika River	24														GR		47	1.2		
230-9913	Ingenika River	24														GR		30	0.2		
230-9913	Ingenika River	24														GR		41	1.3	whoa fat	
230-9913	Ingenika River	24														GR		44	1.2		
230-9913	Ingenika River	24														GR		94	9.1		
230-9913	Ingenika River	24														MWF	30	n/a	n/a		
230-9913	Ingenika River	24														CC	45	n/a	n/a		
230-9913	Ingenika River	25	10	350609	6293917	130	10 MS 12 SC	?	10	40	40	10	slow glide or pool	H5 @ 500V	438	Rb	4	106	n/a		
230-9913	Ingenika River	25														Rb		76	n/a		
230-9913	Ingenika River	25														Rb		72	n/a		
230-9913	Ingenika River	25														Rb		41	n/a		
230-9913	Ingenika River	25														GR	2	40	n/a		
230-9913	Ingenika River	25														GR		41	n/a		
230-9913	Ingenika River	25														MWF	3	n/a	n/a		
230-9913	Ingenika River	25														CC	18	n/a	n/a		
230-9913	Ingenika River	26	10	353704	6290552	275	n/a	5-30	30	70	0	0	cead	90 hz @ 400	738	GR	10	52	1.3	all fish from IP	IP: deep pool 80% of sample + some MS
230-9913	Ingenika River	26														GR		39	0.6		
230-9913	Ingenika River	26														GR		46	1.4		
230-9913	Ingenika River	26														GR		42	0.4		
230-9913	Ingenika River	26														GR		35	0.4		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	26														GR		43	0.8	very fat	
230-9913	Ingenika River	26														GR		45	0.8		
230-9913	Ingenika River	26														GR		31	0.3		
230-9913	Ingenika River	26														GR		35	0.4		
230-9913	Ingenika River	26														GR		46	1.2		
230-9913	Ingenika River	26														BT	1	36	0.4		
230-9913	Ingenika River	26														MWF	1	n/a	n/a		
230-9913	Ingenika River	26														CC	18	n/a	n/a		
230-9913	Ingenika River	26														C	50+	n/a	n/a		
230-9913	Ingenika River	27	10	349245	6293745	100	10.0	0-2	30	70	0	0	slow glide	J5 @ 500V	371	GR	5	43	n/a		2 GR in MS + 3 GR in alcove
230-9913	Ingenika River	27														GR		40	n/a		
230-9913	Ingenika River	27														GR		38	n/a		
230-9913	Ingenika River	27														GR		32	n/a		
230-9913	Ingenika River	27														GR		44	n/a		
230-9913	Ingenika River	27														CC	9	n/a	n/a		
230-9913	Ingenika River	28	10	352259	6292697	280	n/a	5-15	35	65	0	0	dead pools/ BC dead + slow riffle	90 Hz @ 400	890	BT	2	61	2.8		couple of IP + BC
230-9913	Ingenika River	28														BT		35	0.9		
230-9913	Ingenika River	28														GR	7	41	0.6	3 GR from IP	
230-9913	Ingenika River	28														GR		34	0.4		
230-9913	Ingenika River	28														GR		41	0.7		
230-9913	Ingenika River	28														GR		36	0.8		
230-9913	Ingenika River	28														GR		34	0.3		
230-9913	Ingenika River	28														GR		35	0.6	windy	
230-9913	Ingenika River	28														GR		36	0.4		
230-9913	Ingenika River	28														MWF	29	n/a	n/a		
230-9913	Ingenika River	28														CC	50	n/a	n/a		
230-9913	Ingenika River	29	10	347960	6294264	100	10.0	0-20	10	80	10	0	?	J5 @ 500V	506	Rb	2	45	n/a		
230-9913	Ingenika River	29														Rb		43	n/a		
230-9913	Ingenika River	29														GR	1	39	n/a		
230-9913	Ingenika River	29														MWF	4	n/a	n/a		
230-9913	Ingenika River	29														CC	23	n/a	n/a		
230-9913	Ingenika River	30	10	349103	6293645	152	n/a	5-10	50	50	0	0	dead to shallow riffle	90 hz @ 400	485	GR	2	48	1.2	windy for weights	IP is all fines substrate
230-9913	Ingenika River	30														GR		52	1.3		
230-9913	Ingenika River	30														Rb	1	38	1.2		
230-9913	Ingenika River	30														BT	1	151	40.1		
230-9913	Ingenika River	30														BB	1	87	4.4		
230-9913	Ingenika River	30														MWF	2	n/a	n/a		
230-9913	Ingenika River	30														SU	1	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	31	10	346173	6294730	100	12.0	?	10	70	20	0	?	J5 @ 500V	364	GR	5	40	n/a		
230-9913	Ingenika River	31														GR		45	n/a		
230-9913	Ingenika River	31														GR		36	n/a		
230-9913	Ingenika River	31														GR		45	n/a		
230-9913	Ingenika River	31														GR		45	n/a		
230-9913	Ingenika River	31														Rb	2	30	n/a		
230-9913	Ingenika River	31														Rb		34	n/a		
230-9913	Ingenika River	31														MWF	3	n/a	n/a		
230-9913	Ingenika River	31														CC	13	n/a	n/a		
230-9913	Ingenika River	32	10	346899	6294227	100	n/a	2-5	50	45	5	0	slow glide	90 Hz @ 300	260	CC	5	n/a	n/a		puddles were really muddy = NO FISH
230-9913	Ingenika River	33	10	342776	6295447	150	15.0	0-25	10	80	10	0	IP + side channel	J5 @ 500V	479	GR	40	52	n/a		MS Temp 10°C
230-9913	Ingenika River	33														GR		40	n/a		
230-9913	Ingenika River	33														GR		38	n/a		
230-9913	Ingenika River	33														GR		39	n/a		
230-9913	Ingenika River	33														GR		36	n/a		
230-9913	Ingenika River	33														GR		47	n/a		
230-9913	Ingenika River	33														GR		37	n/a		
230-9913	Ingenika River	33														GR		35	n/a		
230-9913	Ingenika River	33														GR		39	n/a		
230-9913	Ingenika River	33														GR		45	n/a		
230-9913	Ingenika River	33														GR		39	n/a		
230-9913	Ingenika River	33														GR		43	n/a		
230-9913	Ingenika River	33														GR		43	n/a		
230-9913	Ingenika River	33														GR		42	n/a		
230-9913	Ingenika River	33														GR		41	n/a		
230-9913	Ingenika River	33														GR		47	n/a		
230-9913	Ingenika River	33														GR		40	n/a		
230-9913	Ingenika River	33														GR		40	n/a		
230-9913	Ingenika River	33														GR		50	n/a		
230-9913	Ingenika River	33														GR		46	n/a		
230-9913	Ingenika River	33														GR		46	n/a		
230-9913	Ingenika River	33														GR		43	n/a		
230-9913	Ingenika River	33														GR		43	n/a		
230-9913	Ingenika River	33														GR		37	n/a		
230-9913	Ingenika River	33														GR		39	n/a		
230-9913	Ingenika River	33														GR		34	n/a		
230-9913	Ingenika River	33														GR		43	n/a		
230-9913	Ingenika River	33														GR		35	n/a		
230-9913	Ingenika River	33														GR		38	n/a		
230-9913	Ingenika River	33														GR		38	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	33														GR		44	n/a		
230-9913	Ingenika River	33														GR		45	n/a		
230-9913	Ingenika River	33														GR		46	n/a		
230-9913	Ingenika River	33														GR		38	n/a		
230-9913	Ingenika River	33														GR		39	n/a		
230-9913	Ingenika River	33														GR		28	n/a		
230-9913	Ingenika River	33														GR		49	n/a		
230-9913	Ingenika River	33														GR		49	n/a		
230-9913	Ingenika River	33														GR		36	n/a		
230-9913	Ingenika River	33														GR		43	n/a		
230-9913	Ingenika River	33														MWF	44	n/a	n/a		
230-9913	Ingenika River	33														CC	12	n/a	n/a		
230-9913	Ingenika River	34	10	345327	6294797	115	n/a	5-10	25	75	0	0	dead	90 Hz @ 400	438	MWF	4	n/a	n/a		U/S Pelly Creek confluence
230-9913	Ingenika River	34														CC	37	n/a	n/a		
230-9913	Ingenika River	35	10	340874	6295123	120	10.0	0- 1m	90	10	0	0	IP in side channel	J5 @ 500V	300	GR	4	48	n/a		
230-9913	Ingenika River	35														GR		37	n/a		
230-9913	Ingenika River	35														GR		41	n/a		
230-9913	Ingenika River	35														GR		34	n/a		
230-9913	Ingenika River	35														CC	60	n/a	n/a		
230-9913	Ingenika River	35														MWF	14	n/a	n/a		
230-9913	Ingenika River	36	10	344479	6295623	126	n/a	5	20	80	0	0	slow shallow riffle	90 Hz @ 400	449	MWF	2	n/a	n/a		4 osprey
230-9913	Ingenika River	36														CC	18	n/a	n/a		
230-9913	Ingenika River	37	10	338135	6295708	80	10.0	0-20	10	40	50	0	?	J5 @ 500V	340	GR	3	44	n/a		algae covered area
230-9913	Ingenika River	37														GR		42	n/a		
230-9913	Ingenika River	37														GR		37	n/a		
230-9913	Ingenika River	37														Rb	2	32	n/a		
230-9913	Ingenika River	37														Rb		26	n/a		
230-9913	Ingenika River	37														MWF	9	n/a	n/a		
230-9913	Ingenika River	37														CC	1	n/a	n/a		
230-9913	Ingenika River	38	10	342491	6295122	80	n/a	5-20	40	60	0	0	IP + slow MS	90 Hz @ 400	586	GR	4	47	1.2		IP + MS
230-9913	Ingenika River	38														GR		45	1.2		
230-9913	Ingenika River	38														GR		36	0.3		
230-9913	Ingenika River	38														GR		34	0.4		
230-9913	Ingenika River	38														CC	19	n/a	n/a		
230-9913	Ingenika River	38														MWF	36	n/a	n/a		
230-9913	Ingenika River	39	10	335663	6297107	100	9.0	0-20	20	40	40	0	slow	J5 @ 500V	332	GR	1	42	n/a		EF 50m MS + 50m SC, fish in MS; temp in SC 8°C

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	39														MWF	8	n/a	n/a		
230-9913	Ingenika River	39														CC	2	n/a	n/a		
230-9913	Ingenika River	40	10	339966	6294991	150	n/a	5-30	20	60	20	0	dead calm	90 Hz @ 400	657	GR	12	51	1.6		lots ot small IP + some MS; 90% GR from IP
230-9913	Ingenika River	40														GR		49	1.5		
230-9913	Ingenika River	40														GR		39	1.1		
230-9913	Ingenika River	40														GR		56	1.4		
230-9913	Ingenika River	40														GR		42	1.1		
230-9913	Ingenika River	40														GR		43	0.8		
230-9913	Ingenika River	40														GR		34	0.5		
230-9913	Ingenika River	40														GR		45	1.3		
230-9913	Ingenika River	40														GR		55	1.9		
230-9913	Ingenika River	40														GR		35	0.6		
230-9913	Ingenika River	40														GR		36	1.7	fat but H2O on scale	
230-9913	Ingenika River	40														GR		43	1.3		
230-9913	Ingenika River	40														BT	1	32	0.5		
230-9913	Ingenika River	40														Rb	2	155	45.0	really spotty	
230-9913	Ingenika River	40														Rb		24	0.6		
230-9913	Ingenika River	40														MWF	2	n/a	n/a		
230-9913	Ingenika River	40														CC	23	n/a	n/a		
230-9913	Ingenika River	41	10	333431	6296929	100	10.0	0-20	10	40	50	0	slow glide	J5 @ 500V	404	GR	3	45	n/a	full stomach	100m MS inside island glide
230-9913	Ingenika River	41														GR		50	n/a		
230-9913	Ingenika River	41														GR		36	n/a		
230-9913	Ingenika River	41														CC	8	n/a	n/a		
230-9913	Ingenika River	42	10	337843	6296477	180	n/a	10	30	45	25	0	dead pools BC very slow	90 Hz @ 400	1128	GR	4	45	1.0		4 IP + BC w/ spring flowing in at top
230-9913	Ingenika River	42														GR		41	0.8		
230-9913	Ingenika River	42														GR		50	1.4		
230-9913	Ingenika River	42														GR		36	0.5		
230-9913	Ingenika River	42														MWF	10	n/a	n/a		
230-9913	Ingenika River	42														CC	8	n/a	n/a		
230-9913	Ingenika River	43	10	329987	6298518	120	9.0	?	10	20	60	10	dead pools	J5 @ 500V	355	GR	5	43	n/a		small SC-nearly IP
230-9913	Ingenika River	43														GR		45	n/a		
230-9913	Ingenika River	43														GR		47	n/a		
230-9913	Ingenika River	43														GR		44	n/a		
230-9913	Ingenika River	43														GR		39	n/a		
230-9913	Ingenika River	43														MWF	2	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	44	10	331684	6297771	135	n/a	15-30	20	60	20	0	slow riffle	90 Hz @ 400	444	MWF	1	n/a	n/a		U/S Wrede Creek; BC + MS
230-9913	Ingenika River	44														CC	8	n/a	n/a		
230-9913	Ingenika River	45	10	328745	6298637	280	9.0	0-2	50	50	0	0	variable	J5 @ 500V	641	GR	5	38	n/a	all from SC mutli section area	Substrate: SC= F50 G 50, MS= F10 G20 C70 B0; Velocity: SC low flow, MS riffle; EF seconds: 405 in SC + 236 in MS
230-9913	Ingenika River	45														GR		41	n/a		
230-9913	Ingenika River	45														GR		45	n/a		
230-9913	Ingenika River	45														GR		36	n/a		
230-9913	Ingenika River	45														GR		39	n/a		
230-9913	Ingenika River	45														CC	2	n/a	n/a	MS	
230-9913	Ingenika River	46	10	331225	6297613	110	n/a	5-15	10	75	15	0	dead pools or slow riffle	90 Hz @ 400	429	GR	1	37	0.2		BC X 2, no MS; significant algae cover
230-9913	Ingenika River	46														MWF	8	n/a	n/a		
230-9913	Ingenika River	46														CC	2	n/a	n/a		
230-9913	Ingenika River	47	10	326926	6299792	100	10.0	0-20	10	10	60	20	riffle edge	j5 @ 600V	291	GR	1	36	n/a		MS- slow edge of cobble/boudler riffle
230-9913	Ingenika River	47														Rb	1	28	n/a		
230-9913	Ingenika River	47														CC	20	n/a	n/a		
230-9913	Ingenika River	48	10	328033	6298726	115	n/a	5-8	10	45	45	0	very slow	90 Hz @ 300	546	GR	5	41	0.7		back eddy puddle w/ flow at top of bar
230-9913	Ingenika River	48														GR		39	0.6		
230-9913	Ingenika River	48														GR		41	1.1		
230-9913	Ingenika River	48														GR		36	0.7		
230-9913	Ingenika River	48														GR		40	1.0		
230-9913	Ingenika River	48														Rb	1	25	0.1		
230-9913	Ingenika River	48														CC	11	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
																					fish came from IP w/ temp of 14'C + sand substrate
230-9913	Ingenika River	49	10	325208	6301261	300	15.0	0 -40	10	10	30	50	dead	J5 @ 500V	472	MWF	5	n/a	n/a		
230-9913	Ingenika River	49														CC	28	n/a	n/a		EF 25m MS rest BC
													slow BC + MS	90 Hz @		CC	12	n/a	n/a		
230-9913	Ingenika River	50	10	326389	6299997	105	n/a	5-10	40	50	10	0	edge	300	1017	MWF	5	n/a	n/a		
230-9913	Ingenika River	50														BT	1	97	10.1		
230-9913	Ingenika River	50														GR	1	41	0.6		
230-9913	Ingenika River	50																			SC w/ sand substrate + some wood
														J5 @							
230-9913	Ingenika River	51	10	322768	6301784	100	10.0	0-20	90	10	0	0	glide	500V	213	0	0			NO FISH	
													slow small BC	90 Hz @							
230-9913	Ingenika River	52	10	324368	6301325	115	n/a	10-20	30	40	30	0	riffle	300	407	MWF	7	n/a	n/a		
230-9913	Ingenika River	52														CC	9	n/a	n/a		
																					EF 100m MS + 100m SC; SC: cobble boulder; MS pool glide to riffle = fish; smapled vartiety of habitat & all fish in cobble at edge of MS riffle
							14 SC							J5 @							
230-9913	Ingenika River	53	10	321350	6302680	200	10 MS	?	20	30	30	20	dead	500V	408	Rb	4	30	n/a		
230-9913	Ingenika River	53														Rb		33	n/a		
230-9913	Ingenika River	53														Rb		24	n/a		
230-9913	Ingenika River	53														Rb		31	n/a		
230-9913	Ingenika River	53																			
														90 Hz@							
230-9913	Ingenika River	54	10	323802	6301502	100	n/a	5-30	10	30	60	0	back eddy + IP	300	443	CC	13	n/a	n/a		
																					boudler garden excellent habitat; pool tailout
														J5 @							
230-9913	Ingenika River	55	9	682138	6303065	100	9.0	0-20	10	10	10	70	low	500V	426	BT	3	42	n/a		
230-9913	Ingenika River	55														BT		180	n/a		
230-9913	Ingenika River	55														BT		99	n/a		
230-9913	Ingenika River	55														Rb	1	103	n/a		
													dead IP + slow	90 Hz @							SC + IP
230-9913	Ingenika River	56	10	319598	6302672	150	n/a	5-15	10	60	30	0	glide SC	300	537	BT	2	93	9.6		
230-9913	Ingenika River	56														BT		57	2.4		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	56														MWF	4	n/a	n/a		
230-9913	Ingenika River	56														CC	13	n/a	n/a		
230-9913	Ingenika River	57	9	681148	6303384	100	9.0	0-20	10	10	40	40	side of riffle	J5 @ 500V	428	Rb	2	30	n/a		Island below falls area; fish in calm water
230-9913	Ingenika River	57														Rb		71	n/a	fat	
230-9913	Ingenika River	57														BT	1	62	n/a		
230-9913	Ingenika River	58	10	317400	6303065	135	n/a	5-15	10	20	70	0	dead or very slow	90 Hz @ 300	598	BT	3	125	24.0		SC + top bar MS; EF 115m in SC
230-9913	Ingenika River	58														BT		68	3.6		
230-9913	Ingenika River	58														BT		68	3.6		
230-9913	Ingenika River	58														Rb	1	74	5.6		
230-9913	Ingenika River	58														CC	12	n/a	n/a		
230-9913-263	Cutbank Creek	59	10	352081	6292912	100	8.0	0-20	20	40	40	0	pool + riffle	J5 @ 500V	372	BT	4	88	n/a	most fish caught in IP	IP : 90% fines
230-9913-263	Cutbank Creek	59														BT		45	n/a		
230-9913-263	Cutbank Creek	59														BT		30	n/a		
230-9913-263	Cutbank Creek	59														BT		35	n/a		
230-9913-263	Cutbank Creek	59														MWF	1	n/a	n/a		
230-9913-263	Cutbank Creek	59														CC	5	n/a	n/a		
230-9913	Ingenika River	60	9	680486	6303247	140	n/a	5-10	5	20	75	0	slow to med riffle glide	90 Hz@ 300	424	Rb	1	29	0.4		D/S angle site #2
230-9913	Ingenika River	60														BT	3	68	3.9		
230-9913	Ingenika River	60														BT		55	1.7		
230-9913	Ingenika River	60														BT		40	2.2		
230-9913	Ingenika River	60														CC	22	n/a	n/a		
230-9913	Ingenika River	61	10	373657	6289082	250	11.0	0-20	10	40	40	10	?	J5 @ 400V	1199	GR	1	54	n/a		all fish in MS; EF 200m MS + 50m IP
230-9913	Ingenika River	61														LNC	2	n/a	n/a		
230-9913	Ingenika River	61														C	2	n/a	n/a		
230-9913	Ingenika River	61														CC	4	n/a	n/a		
230-9913	Ingenika River	62	10	375343	6289744	80	n/a	5-30	50	50	0	0	slow flow BC	90 Hz@ 300	515	CC	11	n/a	n/a		almost at Ingenika mouth; some LWD
230-9913	Ingenika River	62														MWF	3	n/a	n/a		
230-9913	Ingenika River	62														C	9	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913	Ingenika River	63	10	372929	6289250	100	10.0	0-2	30	30	40	0	slow	J5 @ 500V	391	C	35	n/a	n/a		poor site; shallow spaces between cobble filled w/ silt
230-9913	Ingenika River	63														CC	5	n/a	n/a		
230-9913	Ingenika River	64	10	374843	6289337	110	n/a	2-5	40	50	10	0	medium glide	90 Hz@ 300	376	CC	5	n/a	n/a		EF MS 90m + muddy puddle 20m
230-9913-032	Swannell River	65	10	370672	6285805	130	9 MS 14 SC	0-30	10	20	60	10	slow	J5 @ 500V	478	Rb	1	33	n/a		SC: cobble + algae; MS slow side riffle w/ some velocity
230-9913-032	Swannell River	65														BT	2	67	n/a		
230-9913-032	Swannell River	65														BT		50	n/a		
230-9913-032	Swannell River	65														MW	5	n/a	n/a		
230-9913-032	Swannell River	66	10	370412	6285193	100	n/a	5-20	30	60	10	rac	slow riffle	90 Hz @ 300	467	MWF	2	n/a	n/a		SC + MS 50/50 length
230-9913-032	Swannell River	66														CC	12	n/a	n/a		
230-9913-032	Swannell River	67	10	370200	6284269	110	10.0	0-30	30	30	40	0	?	J5 @ 500V	408	BT	9	43	n/a		Substrate: BC F30 G30 C40 B0, MS: F10 G10 C 40 B40; EF 65m in BC + 45m MS
230-9913-032	Swannell River	67														BT		123	n/a		
230-9913-032	Swannell River	67														BT		99	n/a		
230-9913-032	Swannell River	67														BT		59	n/a		
230-9913-032	Swannell River	67														BT		55	n/a		
230-9913-032	Swannell River	67														BT		52	n/a		
230-9913-032	Swannell River	67														BT		54	n/a		
230-9913-032	Swannell River	67														BT		43	n/a		
230-9913-032	Swannell River	67														BT		53	n/a		
230-9913-032	Swannell River	67														MWF	9	n/a	n/a		
230-9913-032	Swannell River	67														CC	9	n/a	n/a		
230-9913-032	Swannell River	68	10	370207	6283386	100	n/a	5	20	75	5	0	slow riffle	90 Hz @ 300	543	BT	2	86	5.8	MS	EF = SC 80% + MS 20%; Depth in SC = 10cm
230-9913-032	Swannell River	68														BT		55	1.5	SC	
230-9913-032	Swannell River	68														CC	9	n/a	n/a		
230-9913-032	Swannell River	68														MWF	2	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-032	Swannell River	69	10	370100	6282050	100	10.0	0-5	10	10	20	60	edge of riffle	J5 @ 500V	291	0	0			NO FISH	high velocity/energy area; high % boulder substrate w/ small patches of gravel
230-9913-032	Swannell River	70	10	369890	6281124	140	n/a	10	10	60	30	0	dead IP + MS med riffle	90 Hz@ 300	736	BT	1	46	1.7		
230-9913-032	Swannell River	70														MWF	10	n/a	n/a		
230-9913-032	Swannell River	70														CC	12	n/a	n/a		
230-9913-032	Swannell River	71	10	369026	6279546	100	16.0	?	20	30	30	20	?	J5 @ 500V	342	BT	6	65	n/a		two small SC
230-9913-032	Swannell River	71														BT		60	n/a		
230-9913-032	Swannell River	71														BT		66	n/a		
230-9913-032	Swannell River	71														BT		67	n/a		
230-9913-032	Swannell River	71														BT		51	n/a		
230-9913-032	Swannell River	71														BT		57	n/a		
230-9913-032	Swannell River	71														MWF	5	n/a	n/a		
230-9913-032	Swannell River	72	10	369263	6280184	100	n/a	5-15	20	70	10	0	shallow slow riffle pool	90 Hz@ 300	512	BT	12	49	1.5		beautiful SC- ~5m wide, nice cover, flow, substrate; no MS done
230-9913-032	Swannell River	72														BT		50	2.1		
230-9913-032	Swannell River	72														BT		53	1.8		
230-9913-032	Swannell River	72														BT		41	0.4		
230-9913-032	Swannell River	72														BT		49	2.4		
230-9913-032	Swannell River	72														BT		51	1.2		
230-9913-032	Swannell River	72														BT		53	1.9		
230-9913-032	Swannell River	72														BT		41	0.3		
230-9913-032	Swannell River	72														BT		42	0.9		
230-9913-032	Swannell River	72														BT		41	1.0		
230-9913-032	Swannell River	72														BT		41	1.0		
230-9913-032	Swannell River	72														BT		42	0.8		
230-9913-032	Swannell River	72														CC	8	n/a	n/a		
230-9913-032	Swannell River	73	10	365031	6279747	100	12-16	?	10	10	50	30	IP	J5 @ 500V	330	BT	5	64	n/a		isolated pools
230-9913-032	Swannell River	73														BT		64	n/a		
230-9913-032	Swannell River	73														BT		56	n/a		
230-9913-032	Swannell River	73														BT		60	n/a		
230-9913-032	Swannell River	73														BT		51	n/a		
230-9913-032	Swannell River	73														SU	1	n/a	n/a		
230-9913-032	Swannell River	73														MWF	1	n/a	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-032	Swannell River	74	10	361872	6280070	105	n/a	5-10	40	50	10	0	med riffle pool	90 Hz @ 400	583	BT	10	52	1.9		SC- good riffle pool habitat, nice SWD
230-9913-032	Swannell River	74														BT		56	2.1		
230-9913-032	Swannell River	74														BT		60	2.2		
230-9913-032	Swannell River	74														BT		56	1.6		
230-9913-032	Swannell River	74														BT		57	1.8		
230-9913-032	Swannell River	74														BT		56	2.0		
230-9913-032	Swannell River	74														BT		86	7.3		
230-9913-032	Swannell River	74														BT		104	10.0	really spotty on top	
230-9913-032	Swannell River	74														BT		55	1.8		
230-9913-032	Swannell River	74														BT		90	8.5	really spotty on top	
230-9913-032	Swannell River	74														CC	9	n/a	n/a		
230-9913-032	Swannell River	74														MWF	1	n/a	n/a		
230-9913-032	Swannell River	75	10	357808	6282000	180	10.0	0-20	20	30	40	0	riffle glide	J5 @ 500V	338	BT	16	59	n/a		
230-9913-032	Swannell River	75														BT		49	n/a		
230-9913-032	Swannell River	75														BT		58	n/a		
230-9913-032	Swannell River	75														BT		53	n/a		
230-9913-032	Swannell River	75														BT		48	n/a		
230-9913-032	Swannell River	75														BT		46	n/a		
230-9913-032	Swannell River	75														BT		54	n/a		
230-9913-032	Swannell River	75														BT		55	n/a		
230-9913-032	Swannell River	75														BT		56	n/a		
230-9913-032	Swannell River	75														BT		551	n/a		
230-9913-032	Swannell River	75														BT		64	n/a		
230-9913-032	Swannell River	75														BT		55	n/a		
230-9913-032	Swannell River	75														BT		56	n/a		
230-9913-032	Swannell River	75														BT		46	n/a		
230-9913-032	Swannell River	75														BT		48	n/a		
230-9913-032	Swannell River	75														BT		51	n/a		
230-9913-032	Swannell River	75														CC	6	n/a	n/a		
230-9913-032	Swannell River	76	10	360363	6281376	100	n/a	5-30	45	50	5	0	slow shallow riffle + glide SC	90 Hz @ 400	678	BT	34	89	8.5	most BT in 5-10cm	only did SC, high % L/SWD
230-9913-032	Swannell River	76														BT		46	2.4		
230-9913-032	Swannell River	76														BT		60	2.5		
230-9913-032	Swannell River	76														BT		55	2.9		
230-9913-032	Swannell River	76														BT		?	3.3	lost for length	
230-9913-032	Swannell River	76														BT		46	2.0		
230-9913-032	Swannell River	76														BT		50	2.2		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-032	Swannell River	76														BT		124	22.8		
230-9913-032	Swannell River	76														BT		50	2.5		
230-9913-032	Swannell River	76														BT		89	9.1		
230-9913-032	Swannell River	76														BT		84	6.9		
230-9913-032	Swannell River	76														BT		100	10.6		
230-9913-032	Swannell River	76														BT		92	8.5		
230-9913-032	Swannell River	76														BT		44	1.3		
230-9913-032	Swannell River	76														BT		55	2.3		
230-9913-032	Swannell River	76														BT		57	2.5		
230-9913-032	Swannell River	76														BT		78	6.3		
230-9913-032	Swannell River	76														BT		55	2.9		
230-9913-032	Swannell River	76														BT		51	1.9		
230-9913-032	Swannell River	76														BT		58	2.7		
230-9913-032	Swannell River	76														BT		46	1.8		
230-9913-032	Swannell River	76														BT		49	1.9		
230-9913-032	Swannell River	76														BT		49	1.9		
230-9913-032	Swannell River	76														BT		44	2.4		
230-9913-032	Swannell River	76														BT		40	1.1		
230-9913-032	Swannell River	76														BT		51	1.8		
230-9913-032	Swannell River	76														BT		59	2.4		
230-9913-032	Swannell River	76														BT		64	2.7		
230-9913-032	Swannell River	76														BT		62	2.9		
230-9913-032	Swannell River	76														BT		36	2.0		
230-9913-032	Swannell River	76														BT		44	1.0		
230-9913-032	Swannell River	76														BT		54	2.4		
230-9913-032	Swannell River	76														BT		50	1.8		
230-9913-032	Swannell River	76														BT		44	1.1		
230-9913-032	Swannell River	76														MWF	2	n/a	n/a		
230-9913-283	Pelly Creek	77	10	349696	6294042	160	9 MS 12 SC	?	10	20	60	10	IP + SC	J5 @ 500V	462	BT	1	56	n/a		near mouth og Pelly Creek
230-9913-283	Pelly Creek	77														LNC	2	n/a	n/a		
230-9913-283	Pelly Creek	77														MWF	7	n/a	n/a		
230-9913-283	Pelly Creek	77														CC	8	n/a	n/a		
230-9913-263	Cutbank Creek	78	10	351145	6292498	80	n/a	5-10	20	50	30	0	riffle	90 Hz @ 400	354	BT	5	40	1.6	lost 3 BT in cobble	Substrate: MS F20 G50 C30 B0. SC F40 G50 C10 B0; SC small riffle pool
230-9913-263	Cutbank Creek	78														BT		36	0.4	BT here are smaller than Swanell BT	
230-9913-263	Cutbank Creek	78														BT		35	0.6		
230-9913-263	Cutbank Creek	78														BT		40	0.9		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-263	Cutbank Creek	78														BT		36	0.5		
230-9913-283	Upper Pelly Creek	79	10	349801	6300847	80	15.0	0-20	20	60	20	0	variable	J5 @ 500V	223	Rb	22	35	n/a		Pelly Lake outlet so a small trib to Pelly Cr.
230-9913-283	Upper Pelly Creek	79														Rb		51	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		44	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		115	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		51	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		56	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		48	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		62	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		52	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		43	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		43	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		64	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		49	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		46	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		49	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		45	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		54	n/a	very fat	
230-9913-283	Upper Pelly Creek	79														Rb		40	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		47	n/a	deep body	
230-9913-283	Upper Pelly Creek	79														Rb		44	n/a		
230-9913-283	Upper Pelly Creek	79														Rb		56	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-283	Upper Pelly Creek	79														Rb		35	n/a		
230-9913-283	Upper Pelly Creek	79														CC	2	n/a	n/a		
230-9913-283	Pelly Creek	80	10	350143	6294320	119	n/a	5-10	30	40	30	0	bar slow no flow, mid channel good riffle	90 Hz @ 300	694	Rb	4	94	10.1	very healthy	below canyon section
230-9913-283	Pelly Creek	80														Rb		44	0.7		
230-9913-283	Pelly Creek	80														Rb		49	1.7		
230-9913-283	Pelly Creek	80														Rb		48	1.0		
230-9913-283	Pelly Creek	80														BT	1	59	2.2		
230-9913-283	Pelly Creek	80														CC	11	n/a	n/a		
230-9913-283	Pelly Creek	80														MWF	1	n/a	n/a		
230-9913-283	Upper Pelly Creek	81	10	348562	6301455	100	10.0	?	20	40	40	0	slow	J5 @ 500V	410	Rb	1	30	n/a		multi-channeled; MS alcove + SC + IP; most MWF in IP 2 from SC; good small gravel in SC
230-9913-283	Upper Pelly Creek	81														BT	7	57	n/a		
230-9913-283	Upper Pelly Creek	81														BT		84	n/a		
230-9913-283	Upper Pelly Creek	81														BT		60	n/a		
230-9913-283	Upper Pelly Creek	81														BT		52	n/a		
230-9913-283	Upper Pelly Creek	81														BT		56	n/a		
230-9913-283	Upper Pelly Creek	81														BT		55	n/a		
230-9913-283	Upper Pelly Creek	81														BT		50	n/a		
230-9913-283	Upper Pelly Creek	81														MWF	11	n/a	n/a		
230-9913-283	Upper Pelly Creek	82	10	349285	6300575	110	n/a	5-10	20	70	10	0	edge of riffle	90 Hz @ 300	754	BT	1	57	1.6		beautiful creek, good substrate, some S/Lwd, R P habitat w/ SC

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-283	Upper Pelly Creek	82														MWF	1	n/a	n/a		
230-9913-283	Upper Pelly Creek	82														CC	8	n/a	n/a		
230-9913-283	Upper Pelly Creek	83	10	347413	6302722	120	12.0	?	20	60	20	0	?	J5 @ 500V	479	BT	2	55	n/a		EF several small isolated pools, SC + MS
230-9913-283	Upper Pelly Creek	83														BT		47	n/a		
230-9913-283	Upper Pelly Creek	83														MWF	21	n/a	n/a		
230-9913-283	Upper Pelly Creek	84	10	348787	6301924	100	n/a	5-10	15	75	10	0	slow SC	90 Hz @ 300	634	Rb	2	80	6.7	Rb nice + healthy	good habitat w/ some S/Lwd
230-9913-283	Upper Pelly Creek	84														Rb		45	1.2		
230-9913-283	Upper Pelly Creek	84														BT	1	49	1.9		
230-9913-283	Upper Pelly Creek	84														MWF	1	n/a	n/a		
230-9913-283	Upper Pelly Creek	84														CC	22	n/a	n/a		
230-9913-283	Upper Pelly Creek	85	10	342660	6308782	300	10.0	0-40	10	10	20	60	riffle pool	J5 @ 500V	818	BT	1	94	n/a		excellent Rb habitat, rock garden, algae islands
230-9913-283	Upper Pelly Creek	85														CC	6	n/a	n/a		
230-9913-283	Upper Pelly Creek	86	10	345522	6303925	200	n/a	5-35	40	40	20	0	SC R-P slow, MS nice glide	90 Hz @ 300	793	Rb	11	51	1.3		EF 80% SC; all Rb from SC; SC > S/L wd
230-9913-283	Upper Pelly Creek	86														Rb		92	10.8	really spotty	
230-9913-283	Upper Pelly Creek	86														Rb		115	22.7		
230-9913-283	Upper Pelly Creek	86														Rb		87	8.9		
230-9913-283	Upper Pelly Creek	86														Rb		48	1.2		
230-9913-283	Upper Pelly Creek	86														Rb		80	7.8		
230-9913-283	Upper Pelly Creek	86														Rb		45	2.4		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
230-9913-283	Upper Pelly Creek	86														Rb		40	1.4		
230-9913-283	Upper Pelly Creek	86														Rb		86	7.0		
230-9913-283	Upper Pelly Creek	86														Rb		94	10.2		
230-9913-283	Upper Pelly Creek	86														Rb		29	0.5		
230-9913-283	Upper Pelly Creek	86														BT	4	134	25.3		
230-9913-283	Upper Pelly Creek	86														BT		49	0.9		
230-9913-283	Upper Pelly Creek	86														BT		51	n/a	windy	
230-9913-283	Upper Pelly Creek	86														BT		55	1.3		
230-9913-283	Upper Pelly Creek	86														CC	18	n/a	n/a	1 ate the MWF	
230-9913-283	Upper Pelly Creek	86														MWF	1	n/a	n/a		
230-9913-465	Wrede Creek	87	10	335137	6296792	200	8.0	?	20	50	30	0	?	J5 @ 500V	510	Rb	2	36	n/a		EF 100m IP & SC (269 sec)+ 100m MS (241 sec)
230-9913-465	Wrede Creek	87														Rb		38	n/a		
230-9913-465	Wrede Creek	87														BT	2	56	n/a		
230-9913-465	Wrede Creek	87														BT		44	n/a		
230-9913-465	Wrede Creek	87														MWF	2	n/a	n/a		
230-9913-465	Wrede Creek	87														CC	11	n/a	n/a		
230-9913-283	Upper Pelly Creek	88	10	340487	6313582	130	n/a	5-20	30	45	20	5	MS riffle SC slow flow	90 Hz @ 300	554	BT	2	46	0.8		small SC + MS
230-9913-283	Upper Pelly Creek	88														BT		44	0.9		
230-9913-283	Upper Pelly Creek	88														MWF	1	n/a	n/a		
230-9913-283	Upper Pelly Creek	88														CC	12	n/a	n/a		
230-9913	Ingenika River	89	10	334202	6295452	350	7.0	?	10	30	50	10	?	J5 @ 500V	315	BT	4	56	n/a		EF 100m MS + 250m SC + IP w/ finer substrate
230-9913	Ingenika River	89														BT		56	n/a		
230-9913	Ingenika River	89														BT		52	n/a		
230-9913	Ingenika River	89														BT		50	n/a		

WCC	System Name	Site	Zone	Easting	Northing	Site length (m)	Temp (C)	Depth (cm)	F	G	C	B	Velocity (comment)	EF gear Setting	EF Time (sec)	Species	Total	Fork Length (mm)	Weight (g)	Species Comments	Comments
																					angle: no fish; no noticeable barriers; lots S/L wd; cold temp
230-9913-465	Wrede Creek	90	10	327659	6291939	80	n/a	5-20	20	80	0	0	slow SC MS edge of riffle	90 Hz @ 300	370	BT	1	50	0.9		
230-9913-465	Wrede Creek	90														CC	5	n/a	n/a		back channel + IP
230-9913	Ingenika River	91	10	326287	6300504	150	10.0	0-40	20	30	50	0	no flow	J5 @ 500V	385	GR	5	38	n/a		
230-9913	Ingenika River	91														GR		41	n/a		
230-9913	Ingenika River	91														GR		36	n/a		
230-9913	Ingenika River	91														GR		33	n/a		
230-9913	Ingenika River	91														GR		43	n/a		
230-9913	Ingenika River	91														Rb	1	29	n/a		
230-9913	Ingenika River	91														CC	17	n/a	n/a		
230-9913	Ingenika River	91														MWF	1	n/a	n/a		
																					4 fish not caught but suspect MWF
230-9913	Ingenika River	92	10	323597	6301396	105	n/a	5-10	40	60	0	0	MS glide SC slow	90 hz @ 400	473	Rb	1	32	0.7		
230-9913	Ingenika River	92														CC	4	n/a	n/a		
																					Sc w/ some flow but EF IP
230-9913	Ingenika River	93	10	321597	6301905	120	8.0	0-20	10	30	60	0	IP of SC	J5 @ 500V	557	BT	1	54	n/a		
230-9913	Ingenika River	93														MWF	2	n/a	n/a		
230-9913	Ingenika River	93														CC	27	n/a	n/a		
																					2 MS channels + 2 SC
230-9913	Ingenika River	94	10	322344	6301705	100	n/a	5-10	15	80	5	0	MS riffle SC small w/ slow riffle	90 hz @ 400	758	Rb	4	31	0.5		
230-9913	Ingenika River	94														Rb		24	0.4		
230-9913	Ingenika River	94														Rb		25	n/a		
230-9913	Ingenika River	94														Rb		31	0.2		
230-9913	Ingenika River	94														BT	1	44	1.1		
230-9913	Ingenika River	94														CC	13	n/a	n/a		
230-9913	Ingenika River	94														MWF	14	n/a	n/a		
230-9913	Ingenika River	94																			
																					island; boulder garden; angle site= 1 GR
230-9913	Ingenika River	95	9	675060	6306122	200	8.0	0-25	10	10	30	50	riffle edge	J5 @ 600V	345	Rb	1	106	n/a		
230-9913	Ingenika River	95														BT	1	86	n/a		
230-9913	Ingenika River	95														CC	8	n/a	n/a		